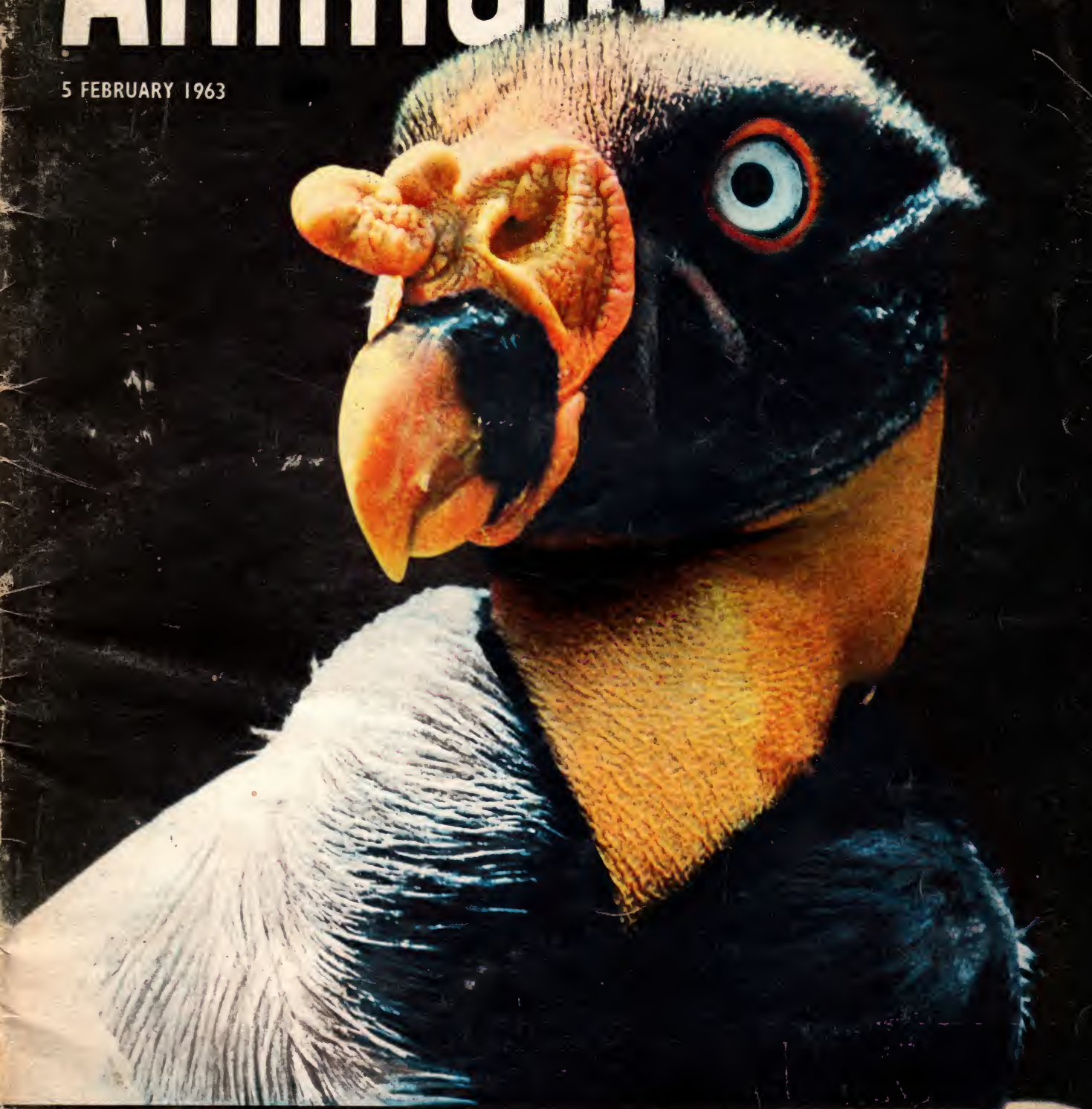


Animals

5 FEBRUARY 1963



SILENT SPRING by Rachel Carson



animals in danger

The Hawaiian goose, or ne-ne, was practically extinct in 1950. Its numbers were dwindling so rapidly that, had it not been for swift and effective action by men such as Peter Scott, it would certainly have disappeared by now. A native of Hawaii, the ne-ne suffered heavily at the hands of the islanders who killed it for food; in addition, wild cats, dogs, and pigs, not to mention the mongoose, played their part in its destruction. However, the world population of ne-nes is now on the increase, and the bird seems to have been saved from ultimate extinction. An article on the Hawaiian goose will be found on **page 15**.

cover picture

The King Vulture (Sarcophaga Paha) is found from tropical Mexico to northern Argentina, usually in wooded country. Its head and foreneck are covered with unattractive brightly-coloured warts and wattles. It has white feathers, with black on the wings and tail, and a collar of grey around its neck. Like all American vultures it has no voice. It is not a common bird, and very little is known about it; one never sees a large flock around a carcass, usually just one or two of them. It has an almost incredible ability to locate carrion.



Animals

VOLUME I NUMBER 5

On Safari with Armand and Michaela Denis	4
The Coypu Michael Tweedie	7
Silent Spring Rachel Carson	10
The Precious Ne-ne John Gaselee	15
The Hippopotamus as a Problem Animal Rennie Bere	19
Zoo Page	22
Inhabitants of the Budongo Forest Vernon Reynolds	24
The Unicorn Legend	28

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Animals can be obtained from all newsagents, or, in case of difficulty, from the publishers.

Rates:

52 weekly copies of **Animals** £5.4.0d.
(inc. post & packing)

26 weekly copies of **Animals** £2.12.0d.
(inc. post & packing)

Payments should be sent to:

Animals,

Department S,

Purnell & Sons Ltd.,

PAULTON, Nr. Bristol.

Back numbers, at 2s., can also be obtained from the above address.



LAST week, as you know, we published the first instalment of Rachel Carson's *Silent Spring*. This week we have the second. I am sure that you now agree with me that this is a great and important book. In America it has aroused furious argument. Miss Carson has been accused by many people of exaggerating the dangers of chemical poisons. We must realise that, very often, the people and institutions who attack her benefit from the expanding use of chemicals. The chemical industry in America has millions of dollars invested in pesticides and naturally wants to protect this huge investment.

Most people who take a genuine interest in biology and are concerned with the protection of wildlife agree that her book is a serious and devastating attack upon human carelessness, greed, and irresponsibility. I happen to know that Prince Philip is enthusiastic about this book and thinks it should be read by as many people as possible.

I chose to have an article this week on the unicorn because of its association with the oryx, that gentle antelope which is now in such serious danger. What is being done to save it has been described in issue Number 2 of **Animals**. There is a wealth of fascinating literature connected with the unicorn. This brings me on to the subject of antelopes' horns in general. Why are some long, others short; some twisted, others straight? We will soon have an article on this subject.

Armand Denis

AS Secretary of the Zoological Society of London I am very pleased to welcome this new magazine, which we all hope will do much to further knowledge of the animals of the world.

From our experience at the London Zoo and Whipsnade Park we know that the urge to learn more of the living creatures around us is not confined to the professional naturalist and zoologist. Broadcasting, television programmes, films and books are now playing their part, in addition to zoos, in stimulating the interest of 'the man



MESSAGE TO Animals

from

Sir Solly Zuckerman,

Honorary Secretary of the Zoological Society of London

in the street' in the animal world. His curiosity is all but insatiable.

I am particularly glad that news of zoos will be a regular feature: for many generations zoos have helped to foster a spirit of enquiry by providing a background of reality to what we learn in books about the wild life of far distant countries. Today zoos also play a vital function in the field of animal conservation. Good zoos, where high standards of animal husbandry and management are maintained, whether their buildings are old

or new, are indispensable in that they provide a home where many of these animals can live and where breeding stocks can be established. Thus they help to safeguard species of animals which are in danger of extinction as the economic and technical development gathers momentum in the areas which are their natural habitat.

This new magazine can do much to bring the interests of conservation and of zoos together.

S. Zuckerman

Sir Solly Zuckerman, who is one of the patrons of **Animals**, is a distinguished Zoologist. Born in 1904, he was educated at South Africa College, Capetown University, and University College Hospital, London. In 1925, he was appointed Demonstrator of Anatomy at Capetown University; since then he has held posts at many universities.

During the Second World War he was scientific adviser to the RAF with the honorary rank of Group Captain and in 1956 he became Honorary Secretary of the Zoological Society of London. He was knighted in the same year.

Since 1960 he has been scientific adviser to the Ministry of Defence and Chairman of the Defence Research Policy Committee.



THE largest of all Africa's animals is the elephant. Not only is it the biggest and heaviest land animal alive today, but there has probably never been a larger mammal living on earth. Despite what many people think, the now-extinct mammoth was a smaller creature than its African relative.

If we travel about 300 miles to the east from our home in Nairobi, and descend to 1,500 feet (Nairobi is 5,500 feet above sea-level), we reach the level of the baobab trees. The baobab always reminds me of the elephant, because it is truly the king of the African trees; like the elephant it is tremendously impressive, and yet at the same time has a touch of the grotesque. This district, near Voi, is a wild and beautiful land . . . it is elephant country.

It is easy to tell that elephants are around from the destruction of the trees; they have laid waste huge areas apparently in a fury of wanton destruction. Sometimes they push the trees right over, but usually they prise off the bark around the trunk of the trees with their tusks; the trees then die rapidly. It is not known exactly why the elephants do this, but it is a problem which is at present worrying the staffs of all the East African



One of the elephants in the Amboseli Reserve

THIRST FOR WATER

ON SAFARI WITH ARMAND AND MICHAELA DENIS

National Parks, where elephants have been breeding freely for years and are now very numerous. It is feared that if too many trees die, soil erosion and drier conditions may result, which, in turn, will reduce the numbers of wild animals which the parks can support.

Another area where the problem is acute is the Murchison Falls Park, in Uganda, where so many trees have

been destroyed by elephants that one is reminded of a great graveyard, stretching across the plains as far as the eye can see.

The elephants seem to be particularly fond of 'de-barking' at the worst time of the year—the peak of the dry season. Perhaps they are driven to this destruction by thirst and by the strain of the awful heat. At this time of year the ravines, usually filled with

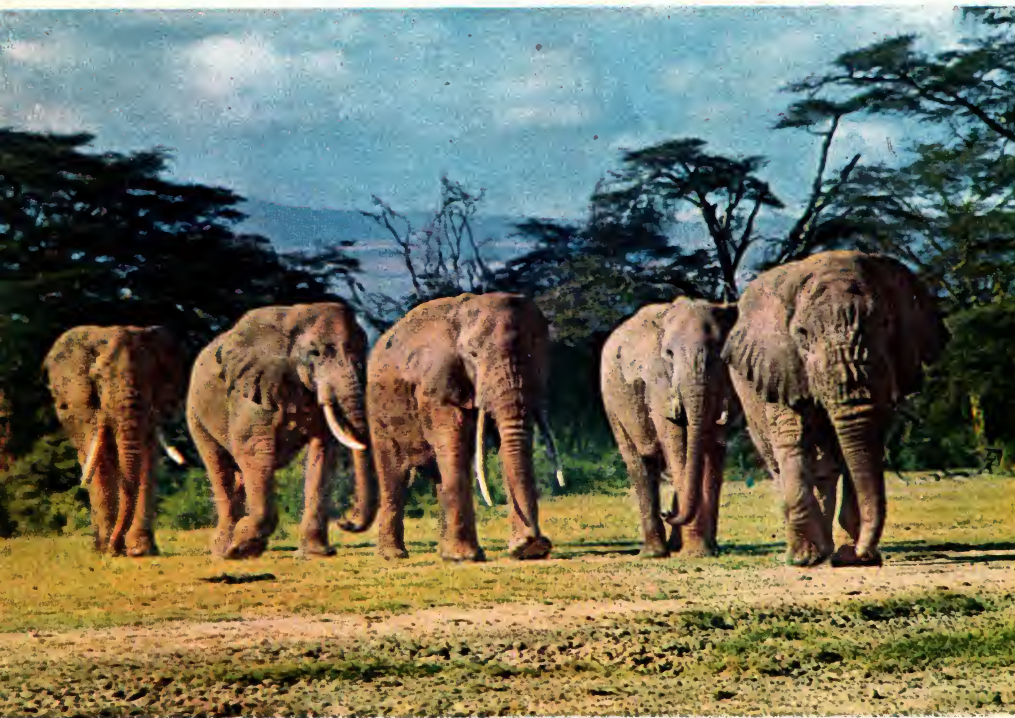
fast-flowing rivers, turn into a muddy slime which is churned by the feet of dozens of elephants.

They normally rest in the forest during the heat of the day, but now they are forced out into the open in their ceaseless quest for water, digging with their tusks where they can smell it, and waiting patiently, sometimes all night, for the trickle which oozes all too slowly into the hole. Others, less



These trees in the Murchison Falls National Park in Uganda have all been destroyed by elephants

Elephants are very social animals; they travel in herds which have a great many laws and customs and a marked discipline of their own



patient, travel huge distances, up to 35 miles in a single day, in search of water.

But, fortunately, there is plenty of water for most of the year and the elephants are often found in swamps and at the edge of rivers. Our photograph on p.4 was taken in a swamp at the Amboseli Game Reserve near Mount Kilimanjaro, in Kenya. The 'plimsoll-line' effect resulted from the elephant wading into the deeper water to eat various types of grasses growing in the swamp. As it came nearer to the shore, the water-mark left on its side remained clearly visible. It was sheer chance that the contour of its marking should coincide with the line of vegetation in the background. Elephants have a naturally dark grey skin colour but often vary in different areas owing to their fondness for having dust baths. They therefore take on the colouration of the soil of their environment; at Amboseli, this is almost white, hence the light colouring along the back ridge of this elephant.

All young animals are attractive, but I think young elephants are especially so. The little fellow is so tiny compared with his great mother that he can easily walk right under her belly, and frequently is lost sight of in the grass. The mother's teats, which are placed between her front legs, are almost, it seems, out of reach of the tiny baby; it is said by native elephant hunters that when the baby is very small he braces his feet against his mother's legs and she then lifts him up with her trunk. But we have never seen this and we find it hard to believe.

The famous legend of the elephants helping a wounded comrade by holding him on his feet and supporting him so that he can escape with the herd, is another story which we did not believe. But some friends of ours once saw this happening with their own eyes while working on the film of *King Solomon's Mines*.

So we are keeping our minds open about the mother lifting up the baby. In Africa one comes to forget words like 'never' and 'always'; one learns that the unexpected often happens.

Having escaped from captivity, coypus are now a menace to farmers

THIRTY years ago there were no coypus in Britain, but by 1961 they were causing so much damage to farms in this country that the Ministry of Agriculture was forced to open a £60,000 campaign against them.

The coypu (*Myopotamus coypu*) is a large rodent which lives in the temperate regions of South America. It is sometimes called the nutria, a name which originated in its native Argentina and is simply the Spanish word for otter. As there are no true otters there, the name was given to this animal which is of similar appearance and habits.

The name nutria is also given to its fur, which consists of a woolly undercoat and long guard hairs which are removed when the skin is prepared for the market. An unusual feature of

length of two feet and a weight of 20 pounds.

In Argentina the coypu population has always fluctuated greatly. During the 19th century they became very scarce due to excessive trapping; they were then given protection and their numbers recovered rapidly. The famous British naturalist, W. H. Hudson who lived in Argentina in the 1860's, wrote of them after they were placed under government protection.

'They increased and multiplied exceedingly, and, abandoning their aquatic habits, became terrestrial and migratory, and swarmed everywhere in search of food. Then suddenly a mysterious malady fell on them, from which they perished and became almost extinct.' Rodents are particularly susceptible to epidemic diseases when they become



THE COYPU

Although valuable to the fur trade, this South American rodent is a menace to East Anglian farmers and will have to be exterminated

MICHAEL TWEEDIE

nutria is that the most valuable part of the fur is on the belly; therefore the animal is skinned by cutting along the back.

The skins are quite large and 22 are sufficient for a full-length coat (as compared with the chinchilla, of which 300 skins are needed to make one coat). In fact, the coypu is one of the largest rodents, and can attain a

Coypus have up to eight young at a time; the mother coypu carries them on her back when she is swimming





East Anglian farmers are using specially designed three-foot long traps to capture the coypus. Here is a baby



The Ministry of Agriculture, with the co-operation of farmers, has already trapped and shot thousands of coypus

The coypu makes its shallow burrow in pond and river banks, with a nesting chamber at the back. This nest is artificial



excessively numerous and overcrowded, but they generally recover their numbers again quite easily.

In the 1930's coypus were introduced to East Anglia from South America by fur farmers, whose intention was to breed the animals for the fur trade. A number of exotic animals have been imported into Britain for this purpose, including silver foxes, musk rats, and mink; the invariable result has been that a certain number escape from captivity and establish themselves as members of the wild fauna. The mink has done so, and is already regarded as a potential nuisance. North American musk rats escaped in Britain in the 1930's; they burrow so extensively in river banks that they cause them to collapse, and can turn a river-valley into a swamp in quite a short time. An intensive campaign was launched against the musk rat, and resulted in its extermination; it is now forbidden to import them into this country.

Coypus also escaped quite soon after being imported; like musk rats, they live in rivers and swamps and burrow in the banks. Although they are much bigger than musk rats, it was thought for a time that they could do little harm, for their burrows are quite short. In addition, they help to keep water courses clear by eating rushes and other water plants. Now, however, they have multiplied to such an extent in Norfolk that they will have to be destroyed. The danger there is that they may weaken the earth works that keep the sea water off the land when there are high tides. With the memory of the disastrous floods of 1953 still fresh in their minds, East Anglian farmers are seriously alarmed by any threat to the sea walls, and they are co-operating actively with the Ministry of Agriculture in its campaign to exterminate the coypu.

Specially designed three-foot long traps are being used, and over 2,000 of them are in use. An administrative staff has been established at Norwich, and information is being plotted on a map to determine the distribution of the animal and the results of the measures against it.



The coypu is a hardy animal; it has had no difficulty in adapting itself to the climate and conditions in England, which are very different from those of its native South America

A brilliant account of the dangers of chemical pesticides by the author of *The Sea Around Us*

SILENT SPRING

Man, by his increasing use of chemical insecticides, is turning the soil and water around him into poisonous traps for wildlife . . .

Part Two

Rachel Carson

IN an age when man has forgotten his origins and is blind even to his most essential needs for survival, water along with other resources has become the victim of his indifference.

The problem of water pollution by pesticides can be understood only in context, as part of the whole to which it belongs—the pollution of the total environment of mankind. The pollution entering our waterways comes from many sources: radio-active wastes from reactors, laboratories, and hospitals; fallout from nuclear explosions; domestic wastes from cities and towns; chemical wastes from factories. To these is added a new kind of fallout—the chemical sprays applied to croplands and gardens, forests and fields.

In the entire water-pollution problem, there is probably nothing more disturbing than the threat of widespread contamination of groundwater. It is not possible to add pesticides to water anywhere without threatening the purity of water everywhere.

It is, of course, not only the groundwaters that are becoming contaminated, but surface-moving waters as well—streams, rivers, and irrigation waters. A disturbing example of the latter seems to be building up on the national wildlife refuges at Tule Lake and Lower Klamath, both in California.

In the summer of 1960 the refuge staff picked up hundreds of dead and dying birds at Tule Lake and Lower Klamath. Most of them were fish-eating species—herons, pelicans, grebes, and gulls. Upon analysis, they were found to contain insecticide residues identified as toxaphene, DDD and DDE. Fish from the lakes were also found to contain insecticides; so did samples of plankton.

The refuge manager believes that pesticide residues are now building up in the waters of these refuges, being conveyed there by return irrigation flow from heavily sprayed agricultural lands. These particular refuges occupy critical positions in the conservation of western waterfowl. They lie at a point corresponding to the narrow neck of a funnel, into which all the migratory paths composing what is known as the 'Pacific Flyway' converge.

During the autumn migration they receive many millions of ducks and geese from nesting grounds extending from the shores of Bering Sea east to Hudson Bay. In summer they provide nesting areas for waterfowl, especially for two endangered species, the redhead and the ruddy duck. If the lakes and pools of these refuges become seriously contaminated, the damage to the waterfowl populations of the Far West could be irreparable.

Water must also be thought of in terms of the chains of life it supports—from the small-as-dust green cells of the drifting plankton, through the minute water fleas to the fishes that strain plankton from the water and are in turn eaten by other fishes or by birds, mink, raccoons—in an endless cyclic transfer of materials from life to life. We know that the necessary minerals in the water are so passed from link to link of the food chains. Can we suppose that poisons we introduce into water will not also enter into these cycles of nature?

The answer is to be found in the amazing history of Clear Lake, California. Its waters have provided an ideal habitat for a small gnat, *Chaoborus astictopus*. Although closely related to mosquitoes, the gnat is not a bloodsucker and probably does not feed at all as an adult. However, human beings who shared its habitat found it annoying

because of its sheer numbers. Efforts were made to control it but they were largely fruitless until, in the late 1940's, the chlorinated hydrocarbon insecticides offered new weapons. The chemical chosen for a fresh attack was DDD, a close relative of DDT but apparently offering fewer threats to fish life.

Control of the gnats was at first good, but by 1954 the treatment had to be repeated.

The following winter months brought the first intimation that other life was affected: the western grebes on the Lake began to die. At Clear Lake the western grebe is a breeding bird and also a winter visitant, attracted by the abundant fish of the lake. It is a bird of spectacular appearance and beguiling habits, building its floating nests in shallow lakes of western United States and Canada. It is called the 'swan grebe' with reason, for it glides with scarcely a ripple across the lake surface, the body riding low, white neck and shining black head held high. The newly hatched chick is clothed in soft grey down; in only a few hours it takes to the water and rides on the back of the father or mother, nestled under the parental wing coverts.

Following a third assault on the ever-resilient gnat population, in 1957, more grebes died. When someone thought to analyse the fatty tissues of the grebes, they were found to be loaded with DDD in the extraordinary concentration of 1,600 parts per million.

The maximum concentration applied to the water was 1/50 part per million. How could the chemical have built up to such prodigious levels in the grebes? These birds, of course, are fish eaters. When the fish of Clear Lake also were analysed the picture began to take form. Plankton organisms were found to contain about 5 parts per million of the insecticide; plant-eating fishes had built up accumulations ranging from 40 to 300 parts per million; carnivorous species had stored the most of all.

The physiological effect of DDD is probably unique among insecticides, for it destroys part of the adrenal gland—the cells of the outer layer known as the adrenal cortex, which secretes the hormone cortin. Is it wise or desirable to use substances with such strong effect on physiological processes for the control of insects, especially when the control measures involve introducing the chemical directly into a body of water?

To understand this more clearly, we must now look at another of the earth's basic resources, the soil.

The soil—key to Man's existence

The thin layer of soil that forms a patchy covering over the continents controls our own existence and that of every other animal of the land. Without soil, land plants as we know them could not grow, and without plants no animals could survive.

Silent Spring Part two

The soil exists in a state of constant change, taking part in cycles that have no beginning and no end. New materials are constantly being contributed as rocks disintegrate, as organic matter decays, and as nitrogen and other gases are brought down in rain from the skies. At the same time other materials are being taken away, borrowed for temporary use by living creatures. Subtle and vastly important chemical changes are constantly in progress, converting elements derived from air and water into forms suitable for use by plants. In all these changes living organisms are active agents.

Perhaps the most essential organisms in the soil are the smallest—the invisible hosts of bacteria and fungi. A teaspoonful of topsoil may contain billions of bacteria. Ray fungi, growing in long threadlike filaments, are somewhat less numerous than the bacteria. With small green cells called algae, these make up the microscopic plant life of the soil.

Specialised tasks

Also present in prodigious numbers are microscopic mites and primitive wingless insects called springtails. The specialisation of some of these minute creatures for their task is almost incredible. Several species of mites, for example, can begin life only within the fallen needles of a spruce tree. Sheltered here, they digest out the inner tissues of the needle. When the mites have completed their development only the outer layer of cells remains. The truly staggering task of dealing with the tremendous amount of plant material in the annual leaf fall belongs to some of the small insects of the soil and the forest floor.

Besides all this horde of minute but ceaselessly toiling creatures there are of course many larger forms, for soil life runs the gamut from bacteria to mammals. Some are permanent residents of the dark subsurface layers; some hibernate or spend definite parts of their life cycles in underground chambers; some freely come and go between their burrows and the upper world.

Of all the larger inhabitants of the soil, probably none is more important than the earthworm. Over three-quarters of a century ago, Charles Darwin gave the world its first understanding of the fundamental role of earthworms as geologic agents for the transport of soil—a picture of surface rocks being gradually covered by fine soil brought up from below by the worms, in annual amounts running to many tons to the acre in most favourable areas. At the same time, quantities of organic matter contained in leaves and grass are drawn down into the burrows and incorporated in soil. And this is by no means all they do: their burrows aerate the soil, keep it well drained, and aid the penetration of plant roots. The presence of earthworms increases the nitrifying powers of the soil bacteria and decreases putre-

*We can easily kill weeds by chemical means,
but can birds and other creatures withstand
these poisons?*



faction of the soil. Organic matter is broken down as it passes through the digestive tracts of the worms and the soil is enriched by their excretory products.

This soil community, then, consists of a web of interwoven lives, each in some way related to the others—the living creatures depending on the soil, but the soil in turn a vital element of the earth only so long as this community within it flourishes.

The problem that concerns us here is one that has received little consideration: What happens to these incredibly numerous and vitally necessary inhabitants of the soil when poisonous chemicals are carried down into their world, either introduced directly as soil 'sterilants' or borne on the rain that has picked up a lethal contamination as it filters through the leaf canopy of forest and orchard and cropland?

From the few studies that have been made, a picture of the impact of pesticides on the soil is slowly emerging.

Sometimes the problem is one of upsetting that delicate balance of populations by which nature accomplishes far-reaching aims. Explosive increases in some kinds of soil organisms have occurred when others have been reduced by insecticides, disturbing the relation of predator to prey. Such changes could easily alter the metabolic activity of the soil and affect its productivity. They could also mean that potentially harmful organisms, formerly held in check, could escape from their natural controls and rise to pest status.

One of the most important things to remember about insecticides in soil is their long persistence, measured not in months but in years. Seemingly moderate applications of insecticides over a period of years may build up fantastic quantities. Potato soils have been found to contain up to 15 pounds of DDT per acre, corn soils up to 19, apple orchards up to 113.

Arsenic provides a classic case of the virtually permanent poisoning of the soil. Although arsenic as a spray on growing tobacco has been largely replaced by the synthetic organic insecticides since the mid-40's, the arsenic content of cigarettes made from American-grown tobacco increased more than 300 per cent between the years 1932 and 1952. Later studies have shown gains as high as 600 per cent.

As applications of pesticides continue and the virtually indestructible residues continue to build up in the soil, it is almost certain that we are heading for trouble.

Disturbing the web of life

Water, soil, and the earth's green mantle of plants make up the world that supports the animal life on the earth. The earth's vegetation is part of a web of life in which there are intimate and essential relations between plants and the earth, between plants and other plants, between plants and animals. Sometimes we have no choice but to

Silent Spring Part two
disturb these relationships, but we should do so thoughtfully, with full awareness that what we may do may have consequences remote in time and place. But no such humility marks the booming 'weed killer' business of the present day.

One of the most tragic examples of our unthinking bludgeoning of the landscape is to be seen in the sagebrush lands of the West.

The land of the sage is the land of the high western plains and the lower slopes of the mountains that rise above them, a land born of the great uplift of the Rocky Mountain system millions of years ago.

As the landscape evolved, there must have been a long period of trial and error in which plants attempted the colonisation of this high and windswept land. At last one group of plants evolved which combined all the qualities needed to survive. The sage—low-growing and shrubby—could hold its place on the mountain slopes and on the plains, and within its small grey leaves it could hold moisture enough to defy the thieving winds.

Along with the plants, animal life, too, was evolving in harmony with the searching requirements of the land. In time there were two as perfectly adjusted to their habitat as the sage. One was a mammal, the fleet and graceful pronghorn antelope. The other was a bird, the sage grouse.

Two-way relationship

The sage and the grouse seem made for each other. The original range for the bird coincided with the range of the sage, and as the sagelands have been reduced, so the populations of grouse have dwindled. The sage is all things to these birds of the plains. The low sage of the foothill ranges shelters their nests and their young; the denser growths are loafing and roosting areas; at all times the sage provides the staple food of the grouse. Yet it is a two-way relationship. The spectacular courtship displays of the cocks help loosen the soil beneath and around the sage, aiding invasion by grasses.

The antelope, too, have adjusted their lives to the sage. They are primarily animals of the plains, and in winter when the first snows come those that have summered in the mountains move down to the lower elevations. There the sage provides the food that tides them over the winter. Though the snow piles up, the tops of the sage remain exposed, or can be reached by the sharp, pawing hoofs of the antelope.

And other life looks to the sage. Mule deer often feed on it. Sage may mean survival for winter-grazing livestock. Sheep graze many winter ranges where the big sagebrush forms almost pure stands.

The bitter upland plains, the purple wastes of sage, the wild, swift antelope, and the grouse are then a natural

Silent Spring Part two

system in perfect balance. Are? The verb must be changed. In the name of progress the land management agencies have set about to satisfy the insatiable demands of the cattlemen for more grazing land. By this they mean grassland—grass without sage. Now millions of acres of sagebrush lands are sprayed each year.

What are the results? The eventual effects of eliminating sage and seeding with grass are largely conjectural.

But even if the programme succeeds in its immediate objective, it is clear that the whole closely knit fabric of life has been ripped apart. The antelope and the grouse will disappear along with the sage. The deer will suffer, too, and the land will be poorer for the destruction of the wild things that belong to it.

Justice William O. Douglas, in his recent book *My Wilderness: East to Katahdin*, has told of an appalling example of ecological destruction wrought in the Bridger National Forest in Wyoming. Some 10,000 acres of sage-lands were sprayed. The sage was killed, as intended. But so was the green, life-giving ribbon of willows that traced its way across these plains, following the meandering streams. Moose had lived in these willow thickets, for willow is to the moose what sage is to the antelope. Beaver had lived there, too, feeding on the willows, felling them and making a strong dam across the tiny stream. Through

'It is not possible to add pesticides to water anywhere without threatening the purity of water everywhere'

the labour of the beavers, a lake backed up. Trout in the mountain streams seldom were more than six inches long; in the lake they thrived so prodigiously that many grew to five pounds. Waterfowl were attracted to the lake, also.

But with 'improvement' instituted by the Forest Service, the willows went the way of the sagebrush, killed by the same impartial spray. When Justice Douglas visited the area in 1959, the year of the spraying, he was shocked to see the shrivelled and dying willows—the 'vast, incredible damage'. What would become of the moose? Of the beavers and the little world they had constructed? A year later he returned to read the answers in the devastated landscape. The moose were gone and so were the beaver. Their principal dam had gone out for want of attention by its skilled architects, and the lake had drained away. None of the large trout were left. None could live in the tiny creek that remained, threading its way through a bare, hot land where no shade remained. The living world was shattered.

As the herbicides rain down on the forest and field, on marsh and rangeland, they are bringing about marked changes and even permanent destruction of wildlife habitat. To destroy the homes and the food of wildlife is perhaps worse in the long run than direct killing.

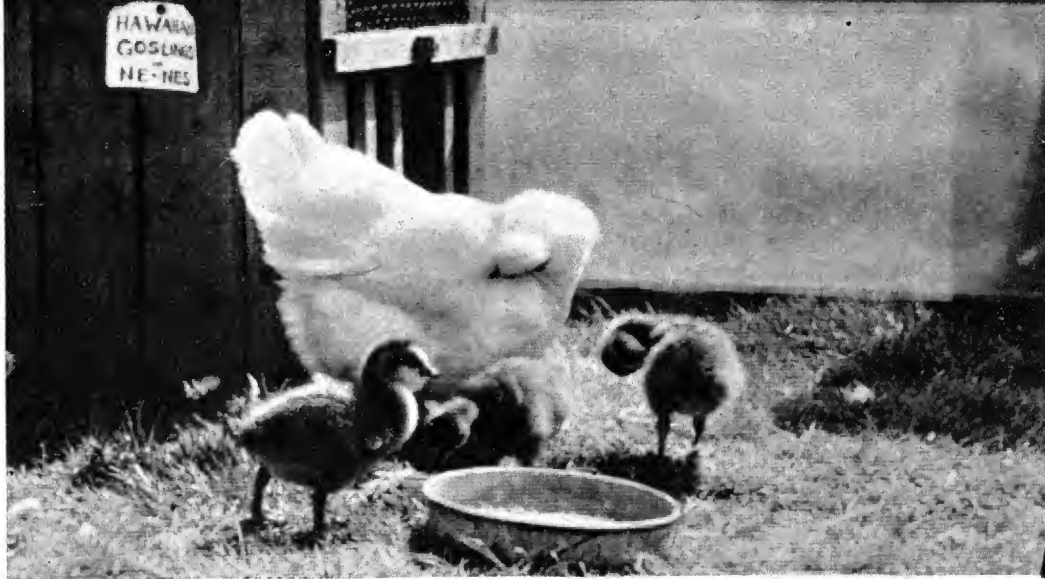
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SILENT SPRING BY RACHEL CARSON
WILL BE PUBLISHED BY HAMISH HAMIL-
TON, LTD., ON FEBRUARY 14TH AT 25s.



ABOUT a century ago, there were some 25,000 wild geese in the Hawaiian Islands; by 1950, however, the world population of these geese, which are known locally as 'ne-nes', had been reduced to no more than 50. The chief cause of this decrease was their destruction by the islanders for food; in addition, there are numbers of wild cats, dogs, and pigs in Hawaii, all of which destroy nests, eggs, and goslings. The mongoose, which was introduced to keep down rats, soon learned that eggs and young geese were easier to obtain.

In little over a decade the world total of these geese has increased to nearly



This hen is foster mother to several ne-ne goslings

THE PRECIOUS NE-NE

After years of patient effort by the Wildfowl Trust, there is at last fresh hope for the rare Hawaiian goose

370, mainly through the efforts of the Wildfowl Trust at Slimbridge in Gloucestershire, which we read about two weeks ago.

In 1950, when it appeared that the ne-ne was facing imminent extinction, John Yealland, then curator of the Wildfowl Trust, went to Hawaii and brought a pair of the geese back to Britain.

Unfortunately, the sexes of this species cannot be distinguished by their plumage, and both birds were found to be females. The eggs which they had laid were removed, so that they should lay a second clutch, and an urgent request was sent to Hawaii for a gander. He arrived within a week, but, because the breeding season in Hawaii is about six weeks earlier than in this country, he was in full moult when he came and as a result the second clutch of eggs was also infertile.

In February 1952, the geese started laying again. The eggs were removed as they were laid and were replaced with dummies. These, in turn, were removed when it was obvious that the clutch was complete. All the eggs were incubated and hatched under hens or bantams, but one of the geese

was left with her last clutch in the hopes that she would incubate the eggs. In fact, however, she allowed them to get cold, so that none of them hatched.

A total of 19 eggs were laid. Of these, 14 were fertile, but only nine hatched. Nevertheless, all nine goslings were reared successfully. When feathered, the smaller and more backward goslings were indistinguishable from the others. At this stage, the Trust had a total of 12 ne-nes, which probably represented about 20 per cent of the world population.

During the following year at Slimbridge various difficulties were encountered. One of the adult females did not complete her moult satisfactorily.

The other goose, after laying the first egg of her second clutch, became severely ill. Staff from Bristol University attended within an hour, and the bird was taken for further treatment to the Veterinary Department of the University—where she recovered rapidly and laid an egg. Subsequently a third clutch was laid. The 1953 breeding season produced a total of only four goslings.

A total of four goslings were reared

John Gaselee

in 1954, and five in 1955, so that by June 1955 the total number of birds alive at Slimbridge was 21.

In 1956 every female old enough laid. There were 62 eggs, of which 22 were fertile, and from these, 16 goslings were hatched and 15 young were reared. This brought the total of ne-nes alive in Europe to 37. By September 1 1957, a total of 129 birds were known to be alive throughout the world, although only about 35 were thought to be in the wild.

Meanwhile, a Professor of Zoology at the University of Missouri completed a year's survey of the ne-ne in Hawaii, during which he found the first nest of a wild ne-ne seen for many years. He saw other wild birds, but discovered that geese which are raised in the far north grow twice as fast as birds which are raised in the tropics, so that they escape the hazards of ground-running predators in half the time. The growth of the ne-ne is hindered because the days are so much shorter in the tropics than in Canada or Iceland; besides which, the ne-ne nests



The ne-ne, or Hawaiian goose, has been saved from possible extinction largely through the efforts of the Wildfowl Trust





Shelter provided for a ne-ne on its nest

in November, December, and January, when the days are shorter than at any other time of the year.

In 1958, 19 birds were reared at Slimbridge out of 21 hatched. There were then 53 birds at Slimbridge, and nine pairs had been sent to other establishments at Peakirk, Basle, Leckford, Rotterdam, Whipsnade, and the United States. At that time, the birds

bred at Slimbridge represented 45 per cent of the world population.

Low fertility was, however, a problem which continued in 1959. For, of the 91 eggs laid, only 47 were fertile. Of these, 24 hatched, and 21 were reared. The total stock originating from the original three birds taken to Slimbridge amounted to 99 birds.

The stock was further increased in 1960 and 1961, but in 1962 only 13 birds were raised from 170 eggs laid.

Nevertheless, in the summer of 1962, 30 full-winged Hawaiian geese were returned, at the expense of the World Wildlife Fund, from Gloucestershire to the Hawaiian Islands. They have been established within a National Park in the crater of Haleakala on the Island of Maui, where the original wild stock had been exterminated. It is hoped to send about 20 young birds to Hawaii from Britain each year, for it is thought that, even now, there are less than 100 birds in the wild.

The way in which this will be carried out will be for special parks to be established adjacent to the birds' natural range. Each park will cover about 30 acres, and will be surrounded by a fence which is proof against cats,

dogs, and pigs. The fence will be about eight feet high so that, at a year old, the young will be able to fly from the park, but will still look upon it as a certain source of food and a haven from predators.

Some flocks, it is hoped, will move permanently on to the wild range, and these will be reinforced each year by the birds raised in the park.

Since the ne-ne has been made the official bird of Hawaii, it is hoped to encourage tourists or parties from schools or other groups to visit these parks. It seems likely that this move would meet with a considerable response—so that the whole project can almost certainly be financed on this basis.

Considerable advances have been made in the last 12 years, with the result that, although there are still thought to be less than 400 ne-nes in the world, their future does seem to be very much more secure. And, even should disease strike any one collection, they are spread sufficiently widely throughout the world so that it would not be a crippling blow. For instance, the greatest concentration is at Slimbridge, where there are 73, but these now represent only about 20 per cent of the world total.

A flock of Hawaiian geese (foreground) at the Wildfowl Trust at Slimbridge in Gloucestershire





The Hippopotamus as a Problem Animal

Although they live in a game sanctuary, many of Uganda's hippos have to be killed

THE hippopotamus spends its days in water, usually quite close against the shore, and its nights on land munching away continuously at the grass which is all it eats. But it is not nearly as placid and easy-going as it looks, and hippos probably are guilty of more acts of wanton aggression than any of the other big animals. Fishermen in their canoes are often attacked by hippos, and accidents on land are not uncommon where hippos are about.

Not long ago, on the outskirts of Uganda's Queen Elizabeth National Park, a youth was foolhardy enough to try to bicycle past a hippo which was grazing on the verge. Remarking to his companion, 'It's all right, it's only a hippo', he rode on; the animal turned quickly, knocked the lad off his machine and, not content with this, bit him almost in half. I myself once had the unpleasant experience of an infuriated hippo trying to join me in a car when I was taking a photograph.

Undoubtedly, hippopotamuses have some reason for their truculence, for throughout the ages they have been hunted by man (many African tribes have devised special hippo-spears) for the enormous quantities of meat which their carcasses provide. But they are almost without other enemies and the absence of predators to control their numbers must lead inevitably to an awkward situation.

Hyenas take a small toll of baby hippos, which the mothers are inclined to abandon at the water's edge during their nightly grazing forays, and lions occasionally attack hippos, although they do not always get the better of them. Visitors at one of the Uganda safari lodges were kept awake half one night by the noise of a battle between a lion and a hippopotamus. The lion had attacked and killed a hippo calf, but the mother returned to avenge her loss in no uncertain manner. In the morning, the mangled remains of a big maned lion were found.

RENNIE BERE

formerly Chief Game Warden of Uganda's National Parks

Hippos graze as near as possible to the waters in which they spend the day, but sometimes they have to walk several miles in search of food. The dominant males in a group establish territorial rights both on land and in the water, and the defence of these rights is the cause of frequent and bloody fighting.

The males travel further for their grazing than the females. When numbers are excessive, they often establish themselves in small inland pools and mud-wallows near the good grass-land. And, with their mouths as well designed for close-cropping as any lawn-mower, they consume at least 100 pounds of grass each night.

For the females there are well-defined nursery areas, always on land, to which they resort regularly for

breeding. The young, which weigh about 120 pounds at birth, are suckled both in and out of the water.

The basin of Lake Edward and Lake George supports one of Africa's major hippo concentrations. Almost the whole shore-line of both lakes, and the 20-mile-long Kazinga channel which joins one to the other, are within the boundaries either of the Queen Elizabeth National Park in Uganda or of the Albert National Park in the Congo. But long before these were set up, most of the human inhabitants had been forced to leave because of tsetse fly and the threat of sleeping sickness. Thus there has been little natural check on the hippos' normal rate of increase, though for various reasons this is not likely to have been very great for a good many years.

In 1958, it was found that there were nearly 14,000 hippopotamuses in the Queen Elizabeth Park alone. With less than half of its 760 square miles available for grazing—most of the rest is either forest-covered or too far away from water—this meant less than 12 acres for each animal.

The hippos themselves, tightly-packed in schools during the day, were lying at the water's edge in such concentration that in places there were 200 to each mile of coast. But they did not have this limited area to themselves, for large numbers of buffalo, elephants, and several species of antelope were competing for the same food. Signs of over-grazing and the beginnings of erosion were evident, particularly near the lakes, the mud-wallows, and the hippo nurseries.

Starvation almost inevitable

A situation detrimental to the hippos themselves, as well as to the other grass-eating animals, was clearly developing. Ultimate starvation, and a fatal reduction of the animal population appeared almost inevitable if numbers were not controlled, particularly since normal reclamation measures could not be carried out because of expense and the impossibility of fencing off large areas to keep out the animals.

Lions, leopards and lesser predators took their habitual toll of most other

hoofed animals, and elephants moved out of the park or into the forests at certain seasons, but the hippos were completely tied to their habitat. Their weights showed that in spite of their numbers they were not prospering; it was found that a large hippo in the Queen Elizabeth Park weighed over 1,000 pounds less than the two and a half tons normal elsewhere.

Of course, there was the possibility that the hippopotamus population, which was reckoned to be nearly twice as much as the land could reasonably support, might slowly re-adjust itself to more reasonable proportions. Some indications of this were to be had in small outbreaks of anthrax in the most crowded hippo areas, and a few instances of mother hippos killing their young, as pigs on a farm sometimes do when wrongly fed. Of these, the first at least was a highly undesirable development.

The whole situation was complicated by several other factors, including an uneven rainfall, unusual soil types, normal changes in the vegetation, and the likelihood of a misunderstanding if violent action were taken in a sanctuary where, to the popular mind at least, untouched nature was supposed to reign supreme. The most important of these, however, was the influence of the hippos on the fishing potential of the lakes.

These two lakes, particularly Lake George, are among the most productive in the world, and they support a thriving fishing industry. This is aided by the hippos, which provide an almost continuous application of organic manure to the lake bottoms, and so assist the growth of the microscopic plant life on which the fish feed. The grass torn from the banks by those demanding jaws reappears as a valuable crop in the nets of local fishermen. But half the hippos would probably do the job just as well.

This is the background to a problem that could not be left alone. A full-scale scientific investigation was inaugurated and is still going on. Certain selected areas were cleared of hippos and are being kept clear by shooting any hippos that return.

So far, rather more than 1,000 hippos have had to be killed, and there has been an amazing improvement in the grassland.

There is none of the atmosphere of big-game hunting in this sort of shooting, which often has to be done at night, when the hippos are on the land, and the warden, whose job it is, would much rather be in bed. It is a serious and rather dull professional undertaking, but of course there are times like this when wild animals have to be killed. These, however should be kept to the minimum demanded by genuine necessity.

Balance of nature

The shooting has provided an opportunity for a thorough biological examination of the hippopotamus. This has never before been possible in such detail with any of the great African mammals. It has also provided an opportunity for testing the possibility of marketing wild animal meat, a matter of considerable importance to the protein-hungry people of Africa. Nothing is being wasted.

The other animals appear undisturbed by these operations. They seem to know that there is no danger for them, and look up from their grazing in a bored manner whenever they hear a shot; but we can hardly credit them with the foresight of realising that the hippos are being killed for their specific benefit.

Nature is never static; its balance is highly sensitive. Few of today's wild land areas are viable ecologically, for man has interfered too much already. And it must be said that the boundaries of most national parks and other conservation areas have had to be determined by political rather than natural considerations.

Man must be prepared to step in and restore the balance where this has been disturbed, directly or indirectly, by his own activities. In the case of the Queen Elizabeth National Park, to have left nature alone would have been, almost certainly, to condemn the hippopotamuses and other animals to ultimate self-extermination, and the land to encroaching desert.



Hippos at the Kazinga channel between Lake Edward and Lake George in Uganda's Queen Elizabeth National Park

The hippopotamus is such a powerful swimmer that it can easily overtake a small motor boat



ZOO PAGE



THE BIGGEST FISHBOWL ON EARTH

Marineland of the Pacific in California is the world's greatest show place of marine life. It is a three-ring sea circus consisting of a 640,000-gallon tank housing a troupe of trained whales; a Sea Arena, featuring sea-lions and trained porpoises; and the biggest fish-bowl on earth, a 540,000-gallon tank containing about 3,000 creatures of more than 100 varieties.

The biggest star of the marine performers is Bubbles, who leads the whale troupe. She can sing, dance, shake hands, wave goodbye, jump completely out of the water, and leap a hurdle. All the whales were captured alive in the open sea by Marineland's collecting crew. This feat has never been accomplished before.

In a future issue, **Animals** will feature a full-colour article on Marineland of the Pacific.

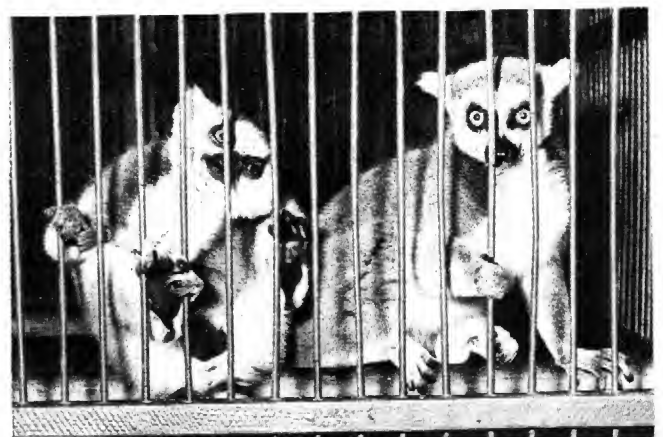
Bimbo, the largest of the whale troupe, can hurl his huge body almost out of the water

AN adult pair of ring-tailed lemurs, Julia and Topsy, have arrived in England from a zoo in the south of France. They are the first to be seen at Chessington for some time as they are difficult to import from their native Madagascar. Most lemurs are tree-dwellers, but the ring-tailed variety are found mainly in the rocky west of the island, and have leathery palms, or soles, for gripping the surface of the boulders. The name lemur means 'ghost', and they are nocturnal creatures, most active at dusk and dawn.

The names of some of the many varieties—Ruffed lemur, mouse lemur, fat-tailed lemur, woolly lemur, gentle lemur, and sportive lemur—are as attractive and charming as the animals themselves. Like the monkeys, apes, and man, they belong to the order of primates.

GHOSTS FROM FRANCE

The fur of ring-tailed lemurs is a delicate shade of grey and their tails are striped





Sheena, one of the two cow seals, nose-dives into the pool at London Zoo

IN BRIEF

The Cleveland Zoo, Ohio, have been having trouble with their striped hyena, Gertie. She has been spending hours removing the drain pipe cover so she can bury bones, hiding them from the sight of her next-door neighbour, a jaguar.

★

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A lesser panda escaped from Chester Zoo last year. He was at large for about five weeks before being recaptured 7 miles from the Zoo. No one knows how he spent these weeks.

SEALS FLOWN IN

Last year, three adult grey seals were collected from the Orkney Islands and delivered to London Zoo. The seals, a 700-pound bull and two 500-pound cows, were collected by the Head Keeper, Don Newson, who spent several weeks in the Orkney Islands with a Nature Conservancy team who were carrying out a seal survey.

The seals were found on an isolated stretch of shore about twelve miles from Kirkwall. Their combined weight was about 19 hundred-weight, including their boxes, so it would have been impossible to transport them by land, or take them off by sea in the small boats which were the only ones available.

However, the Nature Conservancy obtained permission from the Flag Officer, Scotland, for a 'Whirlwind' helicopter from the Royal Naval Air Station at Lossiemouth to fly up to the Orkneys to transport the seals across the islands. They then travelled by steamer to Aberdeen and completed the journey to London by train in a special compartment in which they could be frequently sprayed with water on the way.

The seals have settled in very well together and 'Milly' the Zoo's other seal, does not seem to mind the invasion of her pool by the three newcomers.

ANIMAL EXCHANGE

Animals are constantly being exchanged by Zoos in all parts of the world—one of the many ways in which Zoos co-operate with one another.

Recently a Malayan tapir, an animal never before seen in China, arrived in Peking. It was among a batch of 31 different species which was an exchange of gifts between Indonesian and Chinese zoos. The animals, which also included zebras and tigers, will be distributed in zoos in most of China's large cities after a 'rehabilitation period'.

Animals will be featuring a full-length article on the Peking Zoo in a future issue.



Wild chimpanzees spend most of their time high up in the trees of the forest

INHABITANTS OF THE BUDONGO FOREST

The first of two articles by VERNON REYNOLDS who spent a year studying wild chimpanzees

MANY popular and, indeed, scientific misconceptions have been based on observations of chimpanzees in captivity, although what is being witnessed is merely the adaptation of these highly intelligent creatures to an unnatural environment. Wild chimpanzees do not live in families, have no patriarchal leader, are not frolicsome, carefree half-humans—and they do not even have a distinct home base to which they return.

I recently went to the Budongo Forest in western Uganda on a 10-month expedition, lasting from January until October 1962, especially to study the behaviour of chimpanzees in the wild. The expedition was sponsored by the University of London and the Wilkie Foundation of the USA.

It quickly became apparent to us that you cannot just walk into the forest and expect to find chimpanzees. I shall never forget the despair we experienced at the end of May, having spent the whole month wandering in the spiky, tangled forest without seeing more than a handful of chimpanzees, and, even then, only catching the briefest glimpses of them. Somehow, the hidden, tripping lianas, the great fallen giants which have to be climbed over or crawled under or circumvented with the aid of knives, the disease-ridden swamps which bring up moving blisters under the skin of your feet, the ticks which bury their heads in your flesh and turn purple with your blood, all these are tolerable because of the satisfaction of finding your quarry. Without that satisfaction, life in the forest

can be sheer misery at times; the incessant birdsong overhead, the ceaseless pattern of leaf on leaf, branch over branch, tree-trunk after giant tree-trunk, soon becomes monotonous and meaningless.

We now know that we could not find any chimpanzees in May because it is a month when fruit is very scarce and the chimpanzees are forced on to a diet of leaves. As a result, they are more mobile and scattered than at other times; in addition, they stay down among the saplings in order to eat the tender young leaves and shoots, which makes them far harder to spot and easier to disturb than when they are high up in the tree-tops, maybe 150 feet above the ground, feeding on fruit.

Undefended territory

In their natural forest state, chimpanzees are usually found in very loose bands of 40 to 50 animals, scattered in little parties over an area of six or more square miles. This area may be called the range of these particular chimpanzees, but it is not defended against other chimpanzees—just the reverse. Visiting parties of chimpanzees from other areas may come in, mix, and leave as they wish. The chimpanzees know the location of all the fruit trees within their own area, and probably know the times of the year at which these fruits ripen.



The forest chimpanzees are not meat-eaters; their favourite food is the wild fig



Supporting his whole weight by one arm, this young male chimpanzee is feeding on fruit

Chimpanzees spend most of the day eating, usually in small groups, with a slack period in the hottest part of the day when they snooze and groom each other. Every now and then one of them will change to a new tree; in order to do this it will come down to the ground and climb up the new tree, unless it is adjacent, when it will swing majestically across from branch to branch. (continued overleaf)

Chimpanzees can sometimes be seen crossing the road where it passes through the Budongo Forest





This chimpanzee is calling to his companions from his arboreal perch

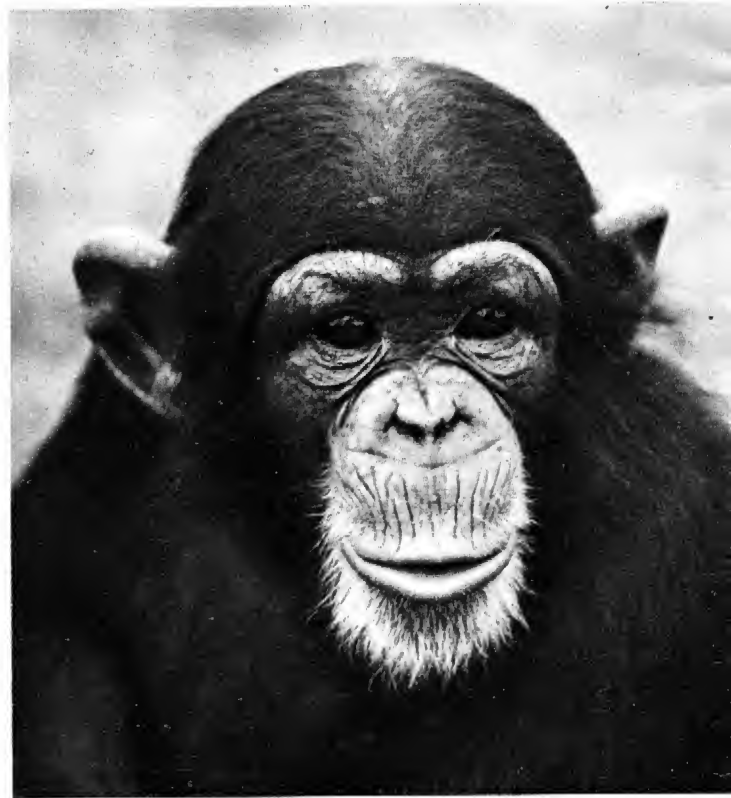
After an hour or two, having eaten all the ripe fruits, the chimpanzees climb down one by one and start foraging around on the ground under the trees (they love a little red tuber which sticks up out of the forest floor and which contains ginger). Then one of them, usually a big adult, will suddenly start making the most amazing sounds, almost impossible to describe.

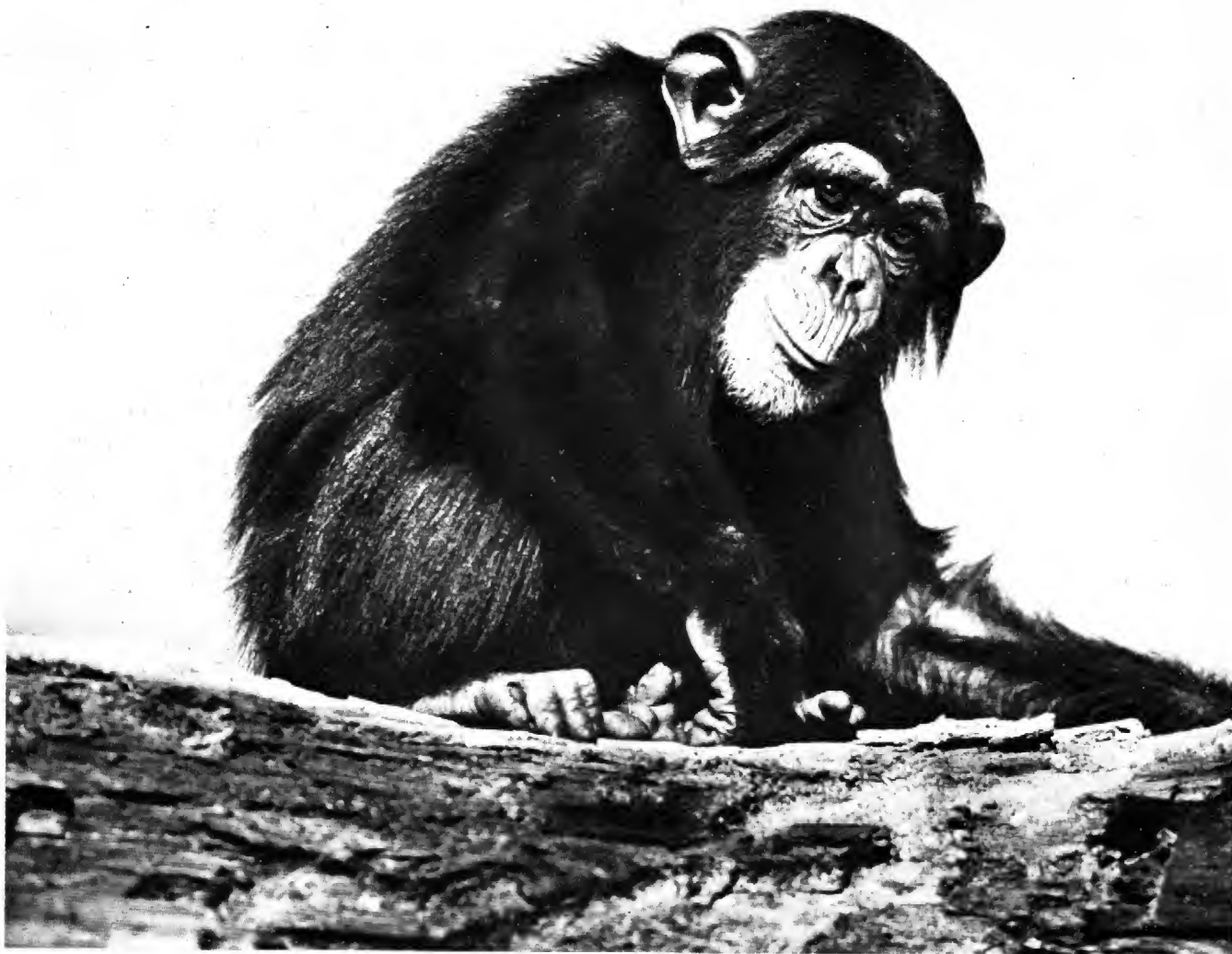
He begins quite low down with his lips pursed and says a sort of 'oo', then draws breath noisily and says a slightly louder and slightly higher 'oo', then two or three more,

each louder and higher pitched than the last; the performance culminates in a series of the wildest and most maniacal screams imaginable accompanied by drumming on the plank buttresses of giant trees. After a while you get used to this—but you can never just accept it. It arouses in humans some deep-felt reciprocal instinct; you want to join in, to start shouting yourself. Apparently the other chimpanzees also feel like this, for as the 'music' rises to its crescendo, more and more of them join in until the air is filled with their screams. One may rush around shaking and breaking saplings, while another in the tree overhead is making wild leaps from branch to branch.

Then, just as suddenly as it began, it is all over, and the chimpanzees are sitting around quietly feeding as if nothing had taken place. However, at this moment a reply comes distantly over the tree-tops: another group of chimpanzees, possibly two miles away has heard them, and is shouting and screaming in its turn. Now the first group repeats its performance, and soon all the animals are down on the ground. A chimpanzee track (a well-worn path through the undergrowth, made in the past by the chimpanzees themselves) is found, and off they go in single file towards the others who responded to their calls.

Despite his wrinkled face and hairy chin, this chimpanzee is only a youngster





Chimpanzees supplement their diet of fruit with small insects, which they find on the bark of trees

What the chimpanzees 'say' when they call to each other in this way remains unknown; perhaps they are discussing the relative abundance of food in their respective areas. But the phenomenon is certainly an effective means of communication over the vast tree-filled distances. The fact that chimpanzees are so noisy (they are by far the noisiest of all the forest creatures) was a great advantage to us, since it made it much easier to track them.

Stealthy final approach

We had to make sure that the chimpanzees were unaware of our presence in order that they should behave quite naturally. This meant that when we got within about a hundred yards of them we had to approach at a snail's pace, our eyes fixed on the trees ahead for the first irregular branch movement which would tell us their exact position. Then, when we had located them, we would move into a suitable viewing position, under cover of the lower canopy

of branches. It was just on one of these stealthy final approaches that I got one of the biggest surprises of my life: I was charged by a chimpanzee.

I knew that gorillas will charge (and, indeed, on a subsequent visit to Mount Muhavura in south-west Uganda I was charged by an adult male mountain gorilla), but I had never before heard of charging chimpanzees.

This one was a fully grown male (they can weigh as much as 10 stone) and, unlike the mountain gorilla which I encountered later, he came rushing out of the undergrowth towards me in perfect silence. I lifted my camera tripod above my head, ready to bring it crashing down on top of him if he attacked; at the same time I bellowed at him with as much bravado as I could muster. He came to within three yards of where I was standing and then, to my great relief, he turned and fled.

(to be continued next week)

THERE is no scientific evidence that the unicorn ever existed: like the fire-breathing dragon and the flying horse, the tales of this romantic creature are probably sheer fiction. Yet the idea of a one-horned beast has always exerted power over men's minds—perhaps as a symbol of unity and symmetry—and through the ages

of tradition: it has, in fact, been many animals.

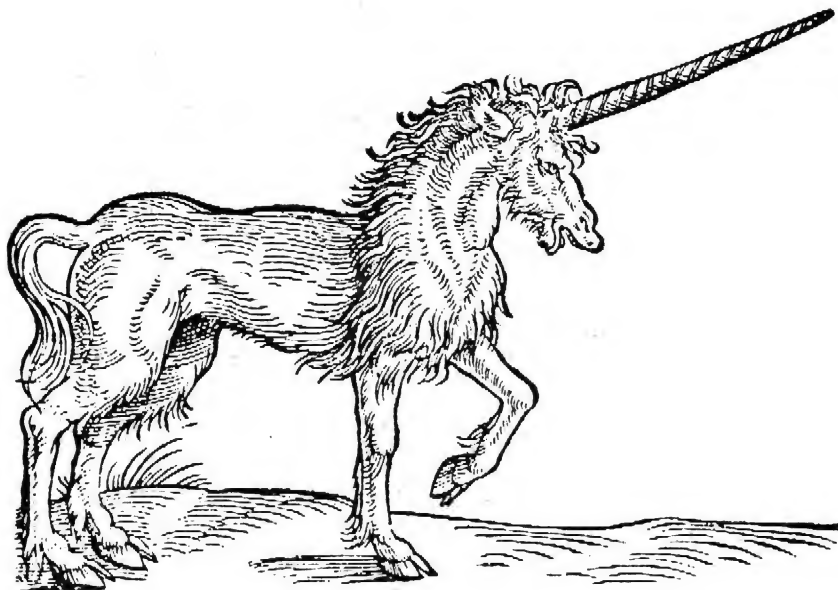
The earliest known records of the unicorn, dating back to about 2,500 BC, were discovered by archaeologists in India. They consist of engravings on clay or stone blocks which were used as seals. These seals have beautifully clear pictures of many animals on

we have comes from an ancient Greek physician, Ctesias, who lived about 400 BC: *'In India there are certain wild asses which are as large as horses and larger. Their bodies are white, their heads are dark red and their eyes dark blue. They have a horn on the forehead which is about a foot and a half in length. The dust filed from this horn is administered in a potion as a protection against deadly medicines.'* Ctesias was probably describing an Indian rhinoceros, but the controversies arising out of these early references have by no means been settled, even now. If the unicorn never lived, the legend of the unicorn has never died.

Aristotle (384-322 BC), the great Greek philosopher and biologist, apparently accepted the existence of strange one-horned creatures. He writes: *'But a few animals are known to be single-horned and single-hoofed, as the Indian ass (Ctesias' rhino) and one, to wit the oryx, is single-horned and cloven-hoofed.'* We do not know where Aristotle got his information about the single-horned oryx. He goes on: *'In such animals the horn is set in the centre of the head, for as the middle belongs equally to both extremes, this arrangement is the one that comes nearest to each side having its own horn.'*

So, by the third century BC, we have the rhino (described as an 'ass') and the one-horned oryx, not to mention pictures of one-horned oxen, waiting to be disputed, elaborated, and thoroughly confused by later scholars. Romans, such as Aelian, Pliny, and Solinus proved as imaginative as the Greeks. Solinus' description is perhaps the most picturesque: *'But the cruellest is the Unicorn, a monster that belloweth horrible, bodyed like a horse, footed like an elephant, tailed like a Swyne, and headed like a Stagge.'*

To add to the confusion, the word 'unicorn' makes its appearance in the Old Testament. In the Hebrew originals, this word was *re'em* meaning the aurochs or European ox, an originally wild European bovine which the early civilisations had domesticated. Thus translated, the passages make good reading, so how did the word ever become 'unicorn'? One suggestion is that the Mesopotamian trans-



THE UNICORN LEGEND

The unicorn is a fabulous creature which belongs to the world of mythology - or does it?

it has continually appeared on royal seals, heraldic emblems, religious and secular paintings, and in ballads, legends, and fables.

The unicorn is usually pictured as having the head and body of a horse, the hind legs of an antelope, the tail of a lion, sometimes the beard of a goat, and always a long, sharp, twisted horn in the centre of its forehead. However, the animal bearing the one horn has not always been the noble war-horse

them, and one can easily recognise tigers, elephants, bison, and rhinoceros. But a very large number show what appears to be a one-horned ox, with the horn pointing forwards from the forehead.

Assyrian cylinder seals, dating from around 900 BC, occasionally show a one-horned antelope-like animal, with wings. On most of the seals the animal is being hunted by men with spears.

The earliest written account which

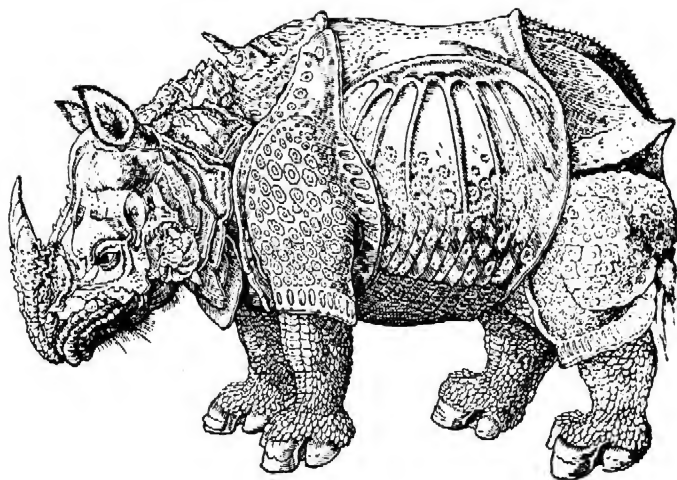


One of the famous series of 16th century French tapestries called La Dame à la licorne (The Lady with the Unicorn), at present in the Musée de Cluny, Paris

lators were working on the basis of certain ancient pictures which show the aurochs in profile in such a way that it appears to have only one, forward-pointing, horn. By this date the aurochs was extinct in Mesopotamia, and so it is possible that the translators actually thought it was a one-horned creature.

Having made its appearance in the Bible, the unicorn legend gained substance. It now could not be regarded as myth; indeed, to cast doubt on its authenticity would have been blasphemy. Thus we find Gesner, the German naturalist, publishing in 1551 a beautiful woodcut of the unicorn (see picture on p. 28) together with a long

description of the beast and the qualities of its horn. He even found that there were three distinct kinds of unicorns: 'For as we have showed already in many stories, that sundry Beasts have not only their divisions, but subdivisions, into subalternate kinds, as many Dogs, many Deer, many Horses, many Mice, many Panthers, and such



Gesner contrasted this rhinoceros (by Dürer) with his unicorn

like, why should there then not also be many Unicorns?’

Gesner goes on to describe the valuable quality of the horn as an antidote for poison, or, as he puts it, ‘venom’. ‘The horn of this Beast being put upon the Table of Kings, and set among their junkets and bankets, doth bewray the venom if there be any such therein, by a certain sweat which cometh over it.’

The unicorn had now split away from the rhinoceros, the oryx, which Gesner dismisses as ‘a wilde Beast unknown in our age’, and the aurochs.

Though he accepted the unicorn as a living quadruped, as real as the cow or the goat, Gesner himself tells us a unicorn legend: ‘It is said that Unicorns above all other creatures, do reverence Virgins and young Maids, and that many times at the sight of them they grow tame, and come and sleep beside them . . . for which occasion the Indian and Aethiopian Hunters use this stratagem to take the beast. They take a goodly strong and beautiful young man, whom they dress in the apparel of a woman, besetting him with divers odorous flowers and spices.

‘The man so adorned, they set in the Mountains or Woods where the Unicorn hunteth, so as the winde may carry the favour to the beast, and in the mean season the other Hunters hide themselves: the Unicorn deceived with the outward

shape of a woman and sweet smells, cometh unto the young man without fear . . . the Hunters come upon him, and by force cut off his horn, and send him away alive’.

This tale was myth to the sixteenth century scientist, while the existence of the creature, and the qualities of its horn, was solid fact. Whether myth or not, variants on this story form the subject of literally hundreds of drawings, paintings, and tapestries throughout Europe, especially during the 15th and 16th centuries.

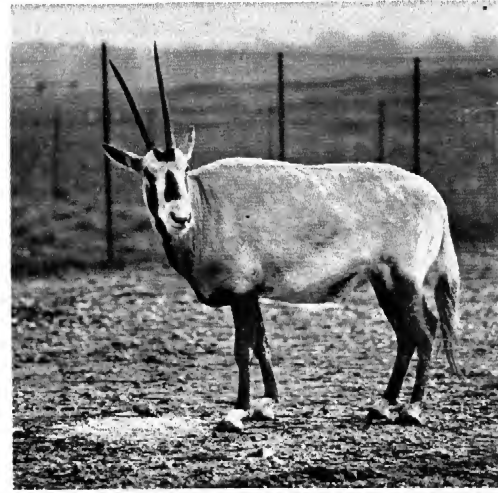
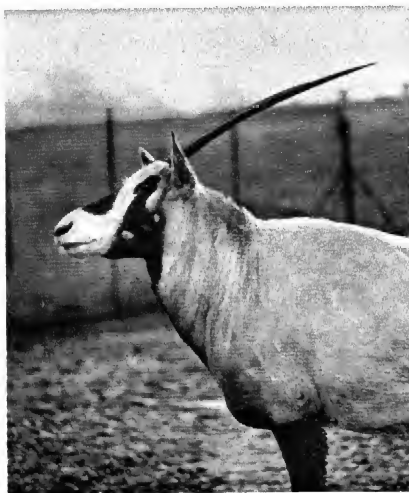
A severe blow to the unicorn legend—as far as the scientific world was

concerned—fell in 1827 when Baron Cuvier declared that a single horned animal of the cloven-hoofed kind was impossible, for such an animal would have a divided frontal bone and no horn could possibly grow upon the division. Nevertheless, a few ardent unicornists desperately produced a theory that the narwhal, a kind of whale which has a single horn, was the original unicorn; but there was clearly no historical evidence to support this theory.

And then an amazing thing happened. In March 1933, an American biologist, Dr W. Franklin Dove, of Maine University, performed a simple operation on a day-old calf. It consisted of cutting the two horn-buds, trimming them flat at their point of contact, and placing them together over the ‘seam’ of the frontal bones. It was thought that they might grow into a single horn spike, sheathed by a single horn. They did. Dr Dove had created a perfect twentieth century unicorn.

So the unicorn is a possibility after all! Was the original one a freak of nature, or of the imagination, or was Dr Dove’s technique known to the ancients?

In profile, the Arabian oryx appears to have only one horn





COMMENT AND LETTERS



Sir,

May I congratulate you and your staff on your new magazine **Animals**. I found the articles interesting and informative, and the colour pictures are quite superb. My children are going to collect **Animals**, and we are looking forward to your future issues.
Hull. Henry Morris.

Sir,

As a teacher, let me express my delight at your new magazine. It is not

always easy to arouse enthusiasm for nature study and the countryside in industrial cities, and I am sure the effect of your vivid presentation will be to heighten interest in wild life among those to whom the sight of even a butterfly is a rare event.

Birmingham.

H. J. Larkin.

Sir,

Your magazine will be welcomed by animal lovers all over the country. To go 'On Safari' with Armand and Michaela Denis among the strange

beasts of Africa brings home to us how much we depend on our own more humdrum domestic animals. Cats, dogs, budgerigars, guinea pigs, and many others are a source of pleasure and companionship to the vast majority of the population. I hope **Animals** will not neglect household pets and will feature them regularly.

Cardiff.

(Miss) J. Baines

(We certainly intend to publish many articles on domestic animals and pets in future issues—Editor).

THE KRUGER PARK FENCE

Among the 'winds of change' at present blowing through Africa, the one which concerns **Animals** most can be summed up in a single word: Conservation. Africa's wildlife heritage is not going to disappear if man can prevent it; large sums of money are already being spent and many people are devoting their lives to this aim.

A major principle of conservation is that animals should be allowed to lead their lives in wholly natural conditions, competing with members of their own and other species, and achieving a natural equilibrium of numbers by preying and being preyed upon. Where a species is seen to be doing too well in the struggle for survival, man can intervene to reduce its numbers, by scientifically planned 'cropping', but wherever possible a natural balance should prevail.

The 400-mile barbed wire fence recently erected around a section of the Kruger National Park in South Africa, was in the opinion of some experts, a mistake and not in the true spirit of conservation. This immense and expensive undertaking has

continued despite a series of tragic losses; many animals have already become entangled in the barbed wire and struggled and shaken themselves to death.

Why was the fence built? The original idea was to prevent the spread of foot-and-mouth disease from wild animals to domestic stock. This has not been achieved, because several species have proved capable of leaping over the fence. More important, however, insufficient research was carried out on the natural movement of herds in the Park area before the fence was started; nor was it ascertained how much space the various species need in order to escape from predators.

At the moment, vultures patrol the fence, while lions have adapted their hunting techniques to the new conditions. In one week, eight giraffes died at the fence. Then there was a temporary water shortage and herds of game gathered by the fence, smelling the water beyond which was their traditional supply, but unable to go towards it. So many roan

antelopes have died because of the fence that more have had to be imported.

PHOTO CREDITS

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The photographs on pages 24 and 25 by Vernon Reynolds are the first colour photographs ever taken of wild chimpanzees in the forest.

Animals



European harvest-mouse (*Mus minutus*)